IN THE CLAIMS

1. (Currently Amended) An electronic system, comprising:

a semiconductor substrate having a first surface, a second surface opposite the first surface, and a hole extending through the semiconductor substrate and connecting the first surface and the second surface;

a first functional circuit on the first surface of the semiconductor substrate;

an optical fiber in the hole, the optical fiber having a cladding layer and a core, the core including a core hole extending along a length of the core, the optical fiber also having a first end and a second end;

an optical transmitter located at the first end of the optical fiber; and

an optical receiver located at the second end of the optical fiber, wherein the optical transmitter and the optical receiver are configured to transmit optical signals through the semiconductor substrate between the first functional circuit and a second functional circuit.

2. (Original) The electronic system of claim 1, wherein the optical transmitter and the optical receiver are configured to transmit the optical signals from the first functional circuit to the second functional circuit.

3. (Original) The electronic system of claim 1, wherein the optical transmitter and the optical receiver are configured to transmit the optical signals from the second functional circuit to the first functional circuit.

4. (Original) The electronic system of claim 1, wherein the cladding layer surrounds the core, and a first index of refraction of the core is greater than a second index of refraction of the cladding layer.

5. (Currently Amended) An electronic system, comprising:

a semiconductor substrate having a first surface, a second surface opposite the first surface, and a hole extending through the semiconductor substrate and connecting the first surface and the second surface;

a first functional circuit on the first surface of the semiconductor substrate;

an optical fiber in the hole, the optical fiber having a cladding layer and a core, the optical fiber also having a first end and a second end;

an optical transmitter located at the first end of the optical fiber; and

an optical receiver located at the second end of the optical fiber, wherein the optical transmitter and the optical receiver are configured to transmit optical signals through the semiconductor substrate between the first functional circuit and a second functional circuit, ~~The electronic system of claim 1,~~ wherein the core of the optical fiber includes a core hole, the core hole running along the center of the optical fiber.

6. (Currently Amended) An electronic system, comprising:

a semiconductor substrate having a first surface, a second surface opposite the first surface, and a hole extending through the semiconductor substrate and connecting the first surface and the second surface;

a first functional circuit on the first surface of the semiconductor substrate;

an optical fiber in the hole, the optical fiber having a cladding layer and a core, the optical fiber also having a first end and a second end;

an optical transmitter located at the first end of the optical fiber; and

an optical receiver located at the second end of the optical fiber, wherein the optical transmitter and the optical receiver are configured to transmit optical signals through the semiconductor substrate between the first functional circuit and a second functional circuit, ~~The electronic system of claim 1~~, further comprising a reflecting mirror lining the hole.

7. (Original) The electronic system of claim 1, wherein the cladding layer includes oxide material.

8. (Original) The electronic system of claim 1, wherein the cladding layer includes nitride material.

9. (Currently Amended) An electronic system, comprising:

a semiconductor substrate having a first surface, a second surface opposite the first surface, and a hole extending through the semiconductor substrate and connecting the first surface and the second surface;

a first functional circuit on the first surface;

a second functional circuit on the second surface;

an optical fiber in the hole, the optical fiber having a cladding layer and a core, the core including a core hole extending along a length of the core, the optical fiber also having a first end and a second end;

an optical transmitter located at the first end of the optical fiber; and

an optical receiver located at the second end of the optical fiber, wherein the optical transmitter and the optical receiver are configured to transmit optical signals through the semiconductor substrate between the first functional circuit and the second functional circuit.

10. (Original) The electronic system of claim 9, wherein the cladding layer includes SiO_2.

11. (Original) The electronic system of claim 9, wherein the cladding layer includes Al_2O_3.

12. (Original) The electronic system of claim 9, wherein the optical fiber is configured to transmit light having a wavelength, and wherein the hole includes a diameter of 0.59 times the wavelength of the light.

13. (Original) The electronic system of claim 9, wherein the optical transmitter includes gallium arsenide.

14. (Original) The electronic system of claim 9, wherein the optical receiver includes a silicon photodiode detector.

15. (Currently Amended) An electronic system, comprising:

a semiconductor substrate having a first surface, a second surface opposite the first surface, and a hole extending through the semiconductor substrate and connecting the first surface and the second surface;

a first functional circuit on the first surface;

a second functional circuit on the second surface;

an optical fiber in the hole, the optical fiber having a cladding layer and a core, the optical fiber also having a first end and a second end;

an optical transmitter located at the first end of the optical fiber; and

an optical receiver located at the second end of the optical fiber, wherein the optical transmitter and the optical receiver are configured to transmit optical signals through the semiconductor substrate between the first functional circuit and the second functional circuit, ~~The electronic system of claim 9,~~ further comprising a reflecting mirror lining the hole.

16. (Withdrawn, currently Amended) An electronic system, comprising:

a first semiconductor substrate having a first surface, a second surface opposite the first surface, and a hole extending through the semiconductor substrate and connecting the first surface and the second surface;

a second semiconductor substrate bonded to the first semiconductor substrate, the second semiconductor substrate having a first surface and a second surface opposite the first surface;

a first functional circuit on the first surface of the first semiconductor substrate;

a second functional circuit on the first surface of the second semiconductor substrate;

an optical fiber in the hole, the optical fiber having a cladding layer and a core, the core including a core hole extending along a length of the core, the optical fiber also having a first end and a second end;

an optical transmitter located at the first end of the optical fiber; and

an optical receiver located at the second end of the optical fiber, wherein the optical transmitter and the optical receiver are configured to transmit optical signals through the first semiconductor substrate between the first functional circuit and the second functional circuit.

17. (Withdrawn) The electronic system of claim 16, wherein the cladding layer includes oxide material.

18. (Withdrawn) The electronic system of claim 16, wherein the cladding layer includes nitride material.

19. (Withdrawn) The electronic system of claim 16, wherein the cladding layer surrounds the core, and a first index of refraction of the core is greater than a second index of refraction of the cladding layer.

20. (Withdrawn, currently Amended) An electronic system, comprising:

a first semiconductor substrate having a first surface, a second surface opposite the first surface, and a hole extending through the semiconductor substrate and connecting the first surface and the second surface;

a second semiconductor substrate bonded to the first semiconductor substrate, the second semiconductor substrate having a first surface and a second surface opposite the first surface;

a first functional circuit on the first surface of the first semiconductor substrate;

a second functional circuit on the first surface of the second semiconductor substrate;

an optical fiber in the hole, the optical fiber having a cladding layer and a core, the optical fiber also having a first end and a second end;

an optical transmitter located at the first end of the optical fiber; and

an optical receiver located at the second end of the optical fiber, wherein the optical transmitter and the optical receiver are configured to transmit optical signals through the first semiconductor substrate between the first functional circuit and the second functional circuit, ~~The electronic system of claim 16,~~ wherein the core of the optical fiber includes a core hole, the core hole running along the center of the optical fiber.

21. (Withdrawn) The electronic system of claim 16, further comprising a reflecting mirror lining the hole.

22. (Withdrawn) The electronic system of claim 16, wherein the optical fiber is configured to transmit light with a wavelength greater than 1.1 microns.

23. (Withdrawn, currently Amended) An electronic system, comprising:

a first semiconductor substrate having a first surface, a second surface opposite the first surface, and a first hole extending through the first semiconductor substrate and connecting the first surface and the second surface;

a second semiconductor having a first surface and a second surface opposite the first surface, and a second hole extending through the first semiconductor substrate and connecting the first surface and the second surface, wherein the second surface of the first semiconductor substrate is bonded to the second surface of the second semiconductor substrate;

a first functional circuit on the first surface of the first semiconductor substrate;

a second functional circuit on the first surface of the second semiconductor substrate;

an optical fiber in the first hole and the second hole, the optical fiber having a cladding layer and a core, the core including a core hole extending along a length of the core, the optical fiber also having a first end and a second end;

an optical transmitter located at the first end of the optical fiber; and

an optical receiver located at the second end of the optical fiber, wherein the optical transmitter and the optical receiver are configured to transmit optical signals through the first semiconductor substrate and the second semiconductor substrate between the first functional circuit and the second functional circuit.

24. (Withdrawn) The electronic system of claim 23, wherein the cladding layer includes SiO_2.

25. (Withdrawn) The electronic system of claim 24, wherein the core includes doped polysilicon.

26. (Withdrawn, currently Amended) The electronic system of claim 25, further comprising a reflecting mirror lining at least one of the first and the second hole.

27. (Withdrawn) The electronic system of claim 24, wherein the core includes Al_2O_3.

28. (Withdrawn) The electronic system of claim 23, further comprising a reflecting mirror lining the hole.

29. (Withdrawn, currently Amended) An electronic system, comprising:

a first semiconductor substrate having a first surface, a second surface opposite the first surface, and a hole extending through the semiconductor substrate and connecting the first surface and the second surface;

a second semiconductor substrate having a first surface and a second surface opposite the first surface, wherein the second surface of the first semiconductor substrate is bonded to the first surface of the second semiconductor substrate;

a first functional circuit on the first surface of the first semiconductor substrate;

a second functional circuit on the first surface of the second semiconductor substrate;

an optical fiber in the hole, the optical fiber having a cladding layer and a core, the core including a core hole extending along a length of the core, the optical fiber also having a first end and a second end;

an optical transmitter located at the first end of the optical fiber; and

an optical receiver located at the second end of the optical fiber, wherein the optical transmitter and the optical receiver are configured to transmit optical signals through the first semiconductor substrate between the first functional circuit and second functional circuit.

30. (Withdrawn) The electronic system of claim 29, wherein the cladding layer includes Al_2O_3.

31. (Withdrawn) The electronic system of claim 30, wherein the core includes doped polysilicon.

32. (Withdrawn) The electronic system of claim 31, further comprising a reflecting mirror lining the hole.

33. (Withdrawn) The electronic system of claim 29, wherein the cladding layer includes SiO_2 and the core includes Al_2O_3.

34. (Original) An electronic system, comprising:

a semiconductor substrate having a first surface, a second surface opposite the first surface, and a hole extending through the semiconductor substrate and connecting the first surface and the second surface;

a memory device on the first surface;

a processor on the second surface;

an optical fiber in the hole, the optical fiber having a cladding layer and a core, the optical fiber also having a first end and a second end;

an optical transmitter located at the first end of the optical fiber; and

an optical receiver located at the second end of the optical fiber, wherein the optical transmitter and the optical receiver are configured to transmit optical signals through the semiconductor substrate between the memory device and the processor.

35. (Original) The electronic system of claim 34, wherein the cladding layer includes SiO_2.

36. (Original) The electronic system of claim 34, wherein the cladding layer includes Al_2O_3.

37. (Original) The electronic system of claim 34, wherein the optical fiber is configured to transmit light having a wavelength, and wherein the hole includes a diameter of 0.59 times the wavelength of the light.

38. (Original) The electronic system of claim 34, wherein the optical transmitter includes gallium arsenide.

39. (Original) The electronic system of claim 34, wherein the optical receiver includes a silicon photodiode detector.

40. (Original) The electronic system of claim 34, further comprising a reflecting mirror lining the hole.

41. (Withdrawn) An electronic system, comprising:

a first semiconductor substrate having a first surface, a second surface opposite the first surface, and a hole extending through the semiconductor substrate and connecting the first surface and the second surface;

a second semiconductor substrate bonded to the first semiconductor substrate, the second semiconductor substrate having a first surface and a second surface opposite the first surface;

a memory device on the first surface of the first semiconductor substrate;

a processor on the first surface of the second semiconductor substrate;

an optical fiber in the hole, the optical fiber having a cladding layer and a core, the optical fiber also having a first end and a second end;

an optical transmitter located at the first end of the optical fiber; and

an optical receiver located at the second end of the optical fiber, wherein the optical transmitter and the optical receiver are configured to transmit optical signals through the first semiconductor substrate between the memory device and the processor.

42. (Withdrawn) The electronic system of claim 41, wherein the cladding layer includes oxide material.

43. (Withdrawn) The electronic system of claim 41, wherein the cladding layer includes nitride material.

44. (Withdrawn) The electronic system of claim 41, wherein the cladding layer surrounds the core, and a first index of refraction of the core is greater than a second index of refraction of the cladding layer.

45. (Withdrawn) The electronic system of claim 41, wherein the core of the optical fiber includes a core hole, the core hole running along the center of the optical fiber.

46. (Withdrawn) The electronic system of claim 41, further comprising a reflecting mirror lining the hole.

47. (Withdrawn) The electronic system of claim 41, wherein the optical fiber is configured to transmit light with a wavelength greater than 1.1 microns.